



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/591,565

05/07/2007

Joachim Koehler

Umicore 0169-US

6226

80336

7590

03/16/2011

Levin Santalone LLP

2 East Avenue

Suite 201

Larchmont, NY 10538

EXAMINER

PARSONS, THOMAS H

ART UNIT

PAPER NUMBER

1729

MAIL DATE

DELIVERY MODE

03/16/2011

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,565	Applicant(s) KOEHLER ET AL.	
	Examiner THOMAS H. PARSONS	Art Unit 1729	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 February 2011.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5 and 11-19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5 and 11-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

This is in response to the Amendment filed 7 February 2011.

(Previous) DETAILED ACTION

1. The objection to the disclosure because of a minor informality has been **withdrawn** in view of Applicants' Amendment.

Claim Rejections - 35 USC § 112

2. The rejection of claims 9-10 under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps has been **withdrawn** in view of Applicants' Amendment.
3. The rejections of claims 5 and 6 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention have been **withdrawn** in view of Applicants' Amendment.

Claim Rejections - 35 USC § 103

4. The rejections of claims 1-3 and 5-8 under 35 U.S.C. 103(a) as being unpatentable over EP 1 229 600 (hereafter EP '600) in view of Imahashi et al. (US 5,350,643) have been **withdrawn**.

Art Unit: 1729

5. The rejection of claim under 35 U.S.C. 103(a) as being unpatentable over EP 1 229 600 (hereafter EP '600) in view of Imahashi et al. (US 5,350,643) as applied to claim 1 above, and further in view of Köller et al. (US 6,844,286) has been **withdrawn**.

6. The rejections of claims 9-10 under 35 U.S.C. 103(a) as being unpatentable over EP 1 229 600 (hereafter EP '600) in view of Imahashi et al. as applied to claim 1 above, and further in view of Iwase et al. (6,245,453) have been **withdrawn**.

Response to Arguments

7. Applicant's arguments, see page 7 line 1 through page 8, line 21, filed 7 February 2011, with respect to claims 1-10 have been fully considered and are persuasive. The rejections of the claims have been **withdrawn**.

(New) DETAILED ACTION

Claim Rejections - 35 USC § 112

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 3, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-3, 5 and 11-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1 229 600 (hereafter EP '600) in view of Yamamoto et al. (US 6,797,426).

Claim 1: EP '600 in Figures 5 and 10 disclose a membrane electrode unit (17 07 35) for membrane fuel cells, comprising an ion-conducting membrane (15 or 34), at least one anode electrode layer (16 or 33), at least one cathode electrode layer (16 or 33), at least one porous, water repellent gas diffusion layer (11 or 31) mounted on the anode side and at least one porous, water repellent gas diffusion layer mounted on the cathode side (11 or 31) (paragraphs [0003], [0024]-[0025], [0033], [0049]-[0050]),

wherein the total pore volume of the cathode gas diffusion layer is higher than the total pore volume of the anode gas diffusion layer ($V_{\text{Cathode}} > V_{\text{Anode}}$) (paragraphs [0074]-[0076] and [0039]-[0040]). **See also entire document.**

EP '600 does not disclose that

the amount of water repellent agent in the anode and the cathode gas diffusion layer is in the range of 20 to 35% by weight (based on the total weight of the gas diffusion layer), and

Art Unit: 1729

the amount of water repellent agent in the anode gas diffusion layer is identical or higher than the amount of water repellent agent in the cathode gas diffusion layer ($WRA_{Anode} \geq WRA_{Cathode}$),

wherein the gas diffusion layers on the anode side and or the cathode side comprise a microlayer with a layer thickness between 10 and 20 microns.

Yamamoto et al. disclose that

the amount of water repellent agent in the anode and the cathode gas diffusion layer is in the range of 20 to 35% by weight (based on the total weight of the gas diffusion layer) (col. 1: 65-col. 2: 3), and

the amount of water repellent agent in the anode gas diffusion layer is identical or higher than the amount of water repellent agent in the cathode gas diffusion layer ($WRA_{Anode} \geq WRA_{Cathode}$) (col. 3: 58-65),

wherein the gas diffusion layers on the anode side and or the cathode side comprise a microlayer with a layer thickness between 10 and 20 microns (col. 5: 59-63, col. 4: 6-11, col. 8: 37-42 and 53-58). **See also entire document.**

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the membrane electrode unit of EP '600 by incorporating the amount of water repellent agent and the microlayer of Yamamoto et al.

One having ordinary skill in the art would have been motivated to make the modification to provide a fuel cell having an improved cell output.

Claim 2: The EP combination does not disclose the total pore volume of the gas diffusion layer on the cathode side (V_{Cathode}) is in the range from 1.0 to 2.5 ml/g and the total pore volume of the gas diffusion layer on the anode side (V_{Anode}) is in the range from 0.5 to 2.0 ml/g.

In particular, EP '600 discloses that it is effective that a gas permeability of the conductive porous base material in the cathode is 1.2 to 2.0 times a gas permeability of the conductive porous base material in the anode. And, that it is effective that a porosity of the conductive porous base material in the cathode is 1.2 to 2.0 times a porosity of the conductive porous base material in the anode.

Therefore, it would have been within the skill of one having ordinary skill in the art at the time the invention was made to have modified the total pore volume of the membrane electrode unit of the EP '600 combination to provide the claimed total pore volume.

One having ordinary skill in the art would have been motivated to make such a modification to provide an improved polymer electrolyte fuel cell having a high discharge characteristic or more specifically a high current-voltage characteristic in a high current density range by optimizing water repellency, thereby improving the overall performance of the fuel cell (see EP '600, paragraph [0032]).

Claim 3: The rejection is as set forth above in claim 1 wherein Yamamoto et al. further disclose that the water repellent agent comprises fluorinated polymers such as PTFE (col. 3: 36-40).

Claim 5: EP '600 discloses that the ion-conducting membrane comprises a proton-conducting polymer materials (i.e. Nafion 112)(paragraph [0092]).

Art Unit: 1729

Claim 11: EP '600 discloses that the proton-conducting polymer material comprises tetrafluoro-ethylene/fluorovinyl ether copolymers (i.e. Nafion 112)(paragraph [0092]).

Claim 12: EP '600 discloses that the tetrafluoro-ethylene/fluorovinyl ether copolymer has sulphonic groups (i.e. Nafion 112)(paragraph [0092]).

Claim 13: EP '600 discloses that the electrode layers comprise a catalytically active, finely divided noble metal (col. 3: 32-36) (see also Yamamoto et al., col. 6: 23-col. 7: 10 and col. 8: 65-col. 8: 25).

Claim 14: EP '600 discloses that the noble metal is platinum (col. 3: 32-36) (see also Yamamoto et al., col. 6: 23-col. 7: 10 and col. 8: 65-col. 8: 25).

Claim 15: EP '600 discloses that the membrane electrode unit further comprises a seal material (paragraph [0072]).

Claim 16: EP '600 discloses reinforcing materials for gas-tight sealing on installation in membrane fuel cell stacks (paragraph [0112]).

Claim 17: The rejection is as set forth above in claim 1 wherein further EP '600 discloses a membrane fuel cell stack comprising the membrane electrode unit.

12. Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over EP 1 229 600 (hereafter EP '600) in view of Yamamoto et al. as applied to claim 1 above, and further in view of Iwase et al. (6,245,453).

EP '600 and Yamamoto et al. are as applied, argued, and disclosed above, and incorporated herein.

Art Unit: 1729

Claim 9: The EP '600 combination discloses a process of operating a fuel cell stack with wet, humidified operating gases (paragraph [0115]) comprising a membrane fuel cell stack comprising the membrane electrode unit set forth above in claim 1.

The EP '600 combination does not disclose operating with dry, unhumidified gases.

Iwase et al. disclose a process for operating a membrane fuel cell stack with dry, unhumidified operating gases, and wet gases (col. 12: 19-23 and 34-44 and col. 12: 64-col. 13: 4).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the process of the EP '600 combination by substituting the wet gas with the dry gas of Iwase et al.

One having ordinary skill in the art would have been motivated to make such a modification because Iwase et al. teach operating a membrane fuel cell stack with dry, unhumidified gas that would have provided superior characteristics over all range of current density, and an improvement in the prevention of the dry-up of the electrolyte film (col. 12: 34-44) thereby improving the overall performance of the fuel cell.

Claim 10: The rejection of claim 10 is as set forth above in claim 9 wherein Iwase et al. further disclose that the dry, unhumidified gases comprise hydrogen and oxygen.

Examiner Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to THOMAS H. PARSONS whose telephone number is (571)272-1290. The examiner can normally be reached on M-F (7:00-3:30).

Art Unit: 1729

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ula Ruddock can be reached on (571) 272-1481. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ula C Ruddock/
Supervisory Patent Examiner, Art Unit 1729

/Thomas H Parsons/
Examiner, Art Unit 1729